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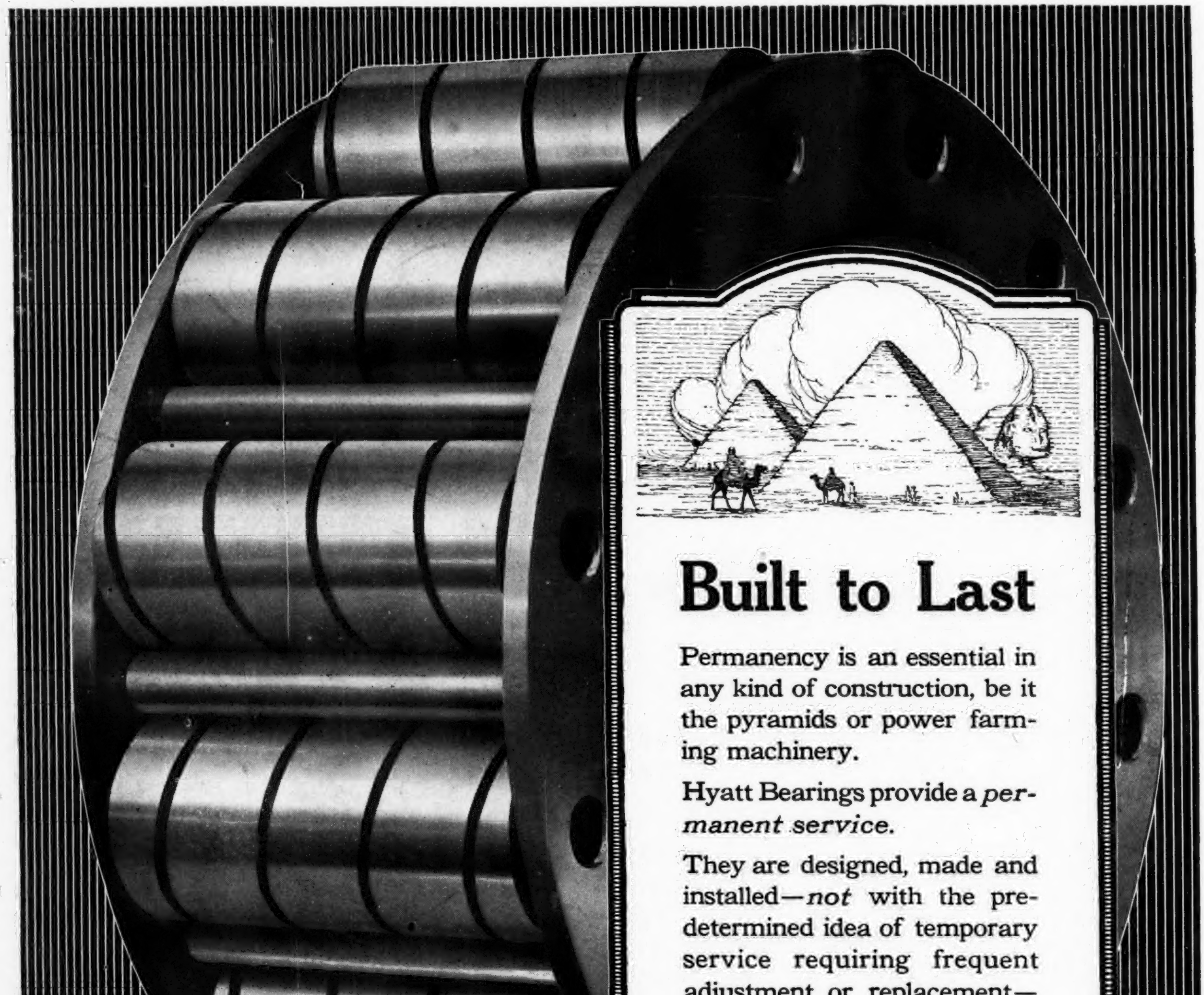
Volume II SEPTEMBER, 1921 Number 9

## CONTENTS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Volume 2 SEPTEMBER, 1921 Number 9

# A Record System For Agricultural Engineering Specialists

By Ivan D. Wood
Mem. A.S.A.E. Extension Agricultural Engineer
University of Nebraska

EDITOR'S NOTE: Many of the state agricultural colleges now have an agricultural-extension service maintained by federal and state funds, the purpose of which is the dissemination of agricultural knowledge to the farmers in the state. Connected with this service are "extension specialists" who cooperate with county agricultural agents situated in the counties of the state. The function of the specialist is to carry the work of the particular department he represents to the people of the state. An agricultural-engineering specialist, for instance, carries agricultural-engineering knowledge to the people in the various counties by actually installing demonstrations. A tile drainage demonstration, or a typical irrigation system, for example, is installed in order to show the latest improvel methods of design.

BEFORE attempting to discuss a record system for specialists it is necessary to analyze the need for such a system and to discuss the things which should be recorded. Extension specialists and county extension agents change jobs frequently. In too many cases the outgoing worker leaves nothing upon which his successor may build and the work suffers in consequence. It is necessary for the new man to start from the beginning; discover by accident, if at all, the unfinished pieces of work; develop new cooperators; and remain in ignorance regarding the finished pieces of work done by his predecessor. This practice is expensive in time and money. It is very possible for an extension specialist to keep his records so complete that his successor may take up the work at any time, cooperate with the same cooperators, and know all that has gone on before him.

A practical record system should permit a specialist to analyze his accomplishments. It should permit him to know just how effective his work has been, whether people are actually putting his teachings into effect, and how successful his teachings are when put into practice. Cases come to mind of busy specialists who rush from one county to another trying vainly to answer all calls for service. They seem so busy that to ask them to keep any kind of records would be too much. They are satisfied in their own mind that they must be doing good work because no moments are ever spent in idleness. Yet in many cases it will be found that such workers have never found themselves; often they are scarcely able to point to one specific piece of work which has been carried through to completion; scarcely able to tell just how certain of their teachings are working in practice; and, in fact, whether or not people are following their recommendations at all.

The universal argument against records in general is "They require too much of my time." A careful analysis of the time question will convince anyone that a few moments spent each day in setting down the entries in a practical record system is well spent compared to several hours at the end of the week or several days at the end of the month vainly trying to remember and record events in the hazy past. Some specialists seem to prefer to take a month in which to make out their annual reports and to spend untold hours over old and smeared note books and sheets of scratch paper trying to dig out their year's activities. With some logical system of records the stenographic force should be able to make up most of the report while the specialist devotes his time to more important tasks.

The record system which I will discuss here has been in constant use in the office of the agricultural engineering extension specialist at the University of Nebraska for six years and has been found very serviceable. The forms and blanks shown will not exactly meet the requirements of all specialists but will serve to give ideas from which they may

CALL CARD

DATE 10/28/19

PROJECT YES X NO

CALLED X CALLED UPON

COOPERATOR'S NAME Peter H. Olson

TOWN Ithaca, Nebr.

NAME OF PROJECT
Peter H. Olson Drainage

OBJECT OF CALL Mr. Olson called to arrange for a demonstration drainage system on his farm.

For each call made to any cooperator, the specialist makes out one of these "call cards." Or if the cooperator calls upon him he also makes out the card and places an (X) after the word "called." This card, for instance, shows that Peter Olson, of Ithaca, Nebraska, called upon the extension engineer to arrange for "The Peter Olson Drainage Project." The card is placed in the project file mentioned in the text. At the end of the month the project file is cleared and copied on the project sheets. The specialist carries a supply of these cards and makes them out as soon as a call has been made. They should be made out in the field and not in the office

build. The system is designed for the use of specialists who have definite plans for carrying on their work; engineering specialists who demonstrate the value of tile drainage by actually installing a drainage system, cooperating with the local farm bureau and some land owner; or the agronomy specialist who shows the superiority of some new crop by planting the crop on the farms of various cooperators in the counties, and who preaches the prevention of erosion by installing brush dams or terraces. The system will be of little use to those specialists who go from one county to another holding scattered meetings and giving promiscuous advice. Below are given some of the things which should be recorded in the office of the agricultural-engineering specialist.

1. Individual Demonstrations Installed
   - (a) Name of cooperator, his town and county
   - (b) Description of land on cooperator's farm
   - (c) Nature of the demonstration as to what was done, etc.
   - (d) Visits to and from the cooperator
   - (e) Kind of information supplied to the cooperator
   - (f) Record of success of the practices advocated
   - (g) Record of persons on surrounding farms imitating the cooperator (spread of influence)
   - (h) Complete field notes on the project which would permit another engineer to take up the work at any time and complete it if necessary
   - (i) Complete sets of blue prints should be on file showing in detail just how each job has been installed
2. Meetings, Lectures, Tractor Demonstrations, Etc.
   - (a) Place of such meetings (town and county)

```
                         DATE  10/28/19
NAME OF COUNTY
NAME OF AGENT  R. H. Watson
NAME OF COOPERATOR  Peter H. Olson
COOPERATOR'S ADDRESS  Ithaca, Nebr.
ASSIGNED TO  I. D. Wood
FOR DATE  5/29/20
NAME OF PROJECT
    Peter H. Olson Drainage Project
LAND DESCRIPTION
    S½ of N.W.¼, Sec. 23, R8E, T14N.
NATURE OF PROJECT  Drainage of 17.3
    acres of depression land in the
    Todd Valley.  Typical of much
    land in the community.  No
    natural outlet available.  Soil
    is Scott Silty Loam, impervious
    to water in second foot.  Plan
    on tile lines 70 feet apart, 3.5
    feet deep.
```

This "project card" is made out by the specialist as soon as the nature of the project is known. It can often be done on the first call to the cooperator. This card gives the data for filling in the top portion of the project sheet with such items as the land description, the name of the cooperator, or his address. The specialist places the card in a card file on his return to the office. It remains in this file until all work pertaining to this project has been done when it is transferred to another file for handy reference. These two card files then will show at a glance all work which has been finished and which projects are still in the process of construction or remain unfinished for any reason. The data is filled in upon the card with a hard pencil by the specialist

```
        TRACTOR DEMONSTRATION
DATE  5/23/21
COUNTY  Lancaster        TOWN  Davey
NAME OF CO. EX. AGENT
    B. L. Montgomery
NO. PEOPLE PRESENT  400
NO. TRACTORS IN COMPETITION  8
NO. ON EXHIBITION  1
DETAILS  Plowing in cornstalk land,
    ground very wet.  (See report of
    demonstration.)
```

This card is filled out just as are those shown above. At the end of the year the stenographic force goes through these card files and makes up the yearly report

```
              MEETINGS
SHORT COURSE                Institute  X
SPECIAL MEETING
DATE  10/20/21
TOWN  Lexington         COUNTY  Dawson
TOTAL PRESENT  153
SUBJECTS DISCUSSED  Rural Sanitation
```

This card is filled out by the specialist for each meeting in the field. It is filed under the name of the county. A glance will show just how many meetings have been held in any county and what the attendance was. The "X" indicates the kind of meeting

```
        AGRICULTURAL TOUR
DATE  6/20/21
COUNTY  Richardson
NAME OF CO. EX. AGENT  Jos. Worrell
NO. PEOPLE  80         NO. AUTOS  21
SUBJECTS DISCUSSED
    Soil Erosion and Farm Buildings.
```

This record card is handled just as is the card for meetings, shown above

(b) Subjects discussed, as "drainage," "Rural Architecture," etc.
(c) Number present
(d) Spread of influence

3. Miscellaneous Records
(a) Persons using stock blue prints
(b) Success of structures built from such plans
(c) Persons in the state receiving information other than regular cooperators. The number of such persons putting the information into practice, also success attained and the spread of influence where possible. (In many cases valuable cost data can be secured from cooperators and others. It should be kept on file.)

The system which will be described here in detail is "The Nebraska System of Extension Specialists Records." It will be discussed from the standpoint of the extension engineer, or engineering specialist as he is called in some institutions, since the system originated in the office of the writer at the University of Nebraska. The entire system hinges on the project sheet. This sheet is a mimeographed blank filled in with the actual data on a drainage project installed as a demonstration.

S A U N D E R S   C O U N T Y

\- 1920 -

DRAINAGE

PETER OLSON

ITHACA
NEBR.

IVAN D. WOOD
Engineer

Sample heading for the loose-leaf field notes ready to be filed under the name of the county

The top of the sheet bears the cooperator's name, town, county, and state. It also bears the name of the project and the subject, such as "Drainage," "Sanitation," "Rural Architecture," or "Erosion," as the case may be. It will also be noticed that the exact location of the farm is recorded with regard to township, range, and section. This data is given for the reason that oftentimes county extension agents change their jobs and the outgoing agent leaves no record as to the work done in his county. The incoming man writes to the engineering specialist for a list of the engineering projects which have been installed in his county and wishes to know the location of each so as to visit them. The engineering specialist sends copies of all the project sheets for that particular county and the problem is solved as the sheet shows the location and nearly all other data regarding each piece of work. Specific data as to location also permits the location of projects on state maps for reports and exhibition purposes.

Next in order on the sheet is a statement regarding the nature of the project. Here should be given a clear and concise statement of the problem in hand and the method proposed for solving it. On the project sheet shown the statement gives a clear idea of the problem and the proposed method of solution. Visits to and from the cooperator are next shown. A short statement as to what was accomplished on each visit should be added. The information as to visits, letters written, bulletins sent out, and blue prints used is all important, more important perhaps than might at first seem.

Suppose a question arises as to what information has been sent out to a cooperator, whether he has had certain blue prints or not, or whether a certain letter has been written. A glance at the project sheet tells the whole story without looking through endless files of correspondence and blue print order sheets. Suppose that five years after a project is installed the county extension agent or extension specialist wishes to write up a press article for the local papers telling of the cooperator's experience with drain tile to promote interest in drainage in other communities and to show the value of county agent work in general. It is only necessary to look at the project sheet for "The Peter Olson Drainage Project," of Saunders County, Nebraska, for instance, where will be found all the data necessary to permit him to say that Mr. Olson called on the extension engineer at Lincoln in October 28, 1919, to ask about draining his farm or that on May 29, 1920, the survey was made and the tile installed according to the engineer's plans in October of the same year. All of these details make a real story and add the human interest phase. Such demonstrations as deal with land reclamation, farmstead development, and other agricultural-engineering problems are slow to reach completion. It may be five years after the installation of a drainage project before the maximum benefits are in evidence. It will then be important to have accurate data as to when the system was installed and how if the greatest good is to come to the farm bureau and the state agricultural college. If the records are hazy and inaccurate the work is as good as lost.

The follow-up record comes next on the project sheet and is important since it shows just what the cooperator does with the plans which the engineering specialist has prepared for him. A glance at the sheet shows just where the job stands and whether or not it has been successful. This part of the sheet is kept up to date by visiting projects while in the counties or by writing to county extension agents or cooperators.

At the bottom of the sheet is another important heading, "Projects Imitated on Surrounding Farms." This tells of

PROJECT NAME Peter Olson Drainage. 1919.
COOPERATOR'S NAME Peter H. Olson SUBJECT Drainage COUNTY Saunders
TOWN Ithaca, STATE Nebraska.

TOWNSHIP 14 North
RANGE 8 East
SECTION 23
FRACTION So. ½ N.W. ¼

NATURE OF PROJECT

The drainage of 17.3 acres of depression land in the Todd Valley. Typical of much land in the community. Depression has no natural outlet. Soil is Scott Silty Loam impervious to water in the third foot. Too wet for cropping. Plan to drain with tile lines 70 feet apart (catch basins).

VISITS

| DATE | TO | FROM | WORK ACCOMPLISHED |
|---|---|---|---|
| 10/28/19 | | x | Mr. Olson called and arranged for demonstration. |
| 5/28/20 | x | | Made preliminary survey and staked out work. |
| 6/11/20 | | x | Asked that the tile order be held until September. |
| 9/30/20 | x | | Helped scatter drain tile. |
| 10/2/20 | x | | Made finished survey. |
| 10/11/20 | x | | Started the contractor to work. |

FOLLOW-UP RECORD

| DATE STARTED | DATE FINISHED | WHAT DONE | REPORT OF SUCCESS OF PROJECT |
|---|---|---|---|
| 10/11/20 | 10/30/20 | Installed | Excellent, May 21, 1921 |
| | | | |
| | | | |

INFORMATION GIVEN
LETTERS

| DATE SENT | KIND OF INFORMATION GIVEN |
|---|---|
| 4/23/20 | Gave earliest possible date for doing the work, May 15, 1920. |
| 6/16/20 | Approximate date for arrival of tile. |
| 6/21/20 | Letter to W. E. Lewis inquiring prices. |
| 6/21/20 | Letter to R. H. Watson enclosing tile order. |
| 7/24-27/20 | Letter to Platte Valley Cement Tile Co. & TenBrink regarding prices. |
| | |

BULLETINS

| DATE SENT | NAME OR NUMBER | BENEFIT RECEIVED |
|---|---|---|
| | | |
| | | |
| | | |

SKETCHES AND BLUEPRINTS

| DATE SENT | KIND OF PRINT | HAS PRINT BEEN USED IN BUILDING? |
|---|---|---|
| 5/30/20 | Special print | Yes. 10/11/20 |
| | | |
| | | |

PROJECT IMITATED ON SURROUNDING FARMS

| DATE STARTED | OWNER'S NAME | REMARKS ON KIND OF WORK DONE |
|---|---|---|
| | | |
| | | |
| | | |

COLLEGE OF AGRICULTURE EXTENSION SERVICE, LINCOLN

SPECIALIST Ivan D. Wood.

SECOND SHEET

PROJECT NAME Peter H. Olson Drainage Project.

COOPERATOR'S NAME Peter H. Olson. COUNTY Saunders.

ADDITIONAL REPORTS

(Record here anything of interest relative to the project which has not been given on the previous page, such as extracts from letters received, cost data, crop yields on drainage projects, etc.)

The preliminary survey for this project was made in May 1920. The work was not installed, however, until September owing to the inability to get a contractor and materials. There was considerable variation in the bids for the work. L. D. Murley, drainage contractor of North Bend, bid $875.00 for the work of digging the ditches and $900.00 for the tile.

(8/13/20) The work was let to Lillie and Carton, of Fremont, who dug it with a Buckeye ditcher.

HISTORICAL

Mr. Olson states that this piece of land was bought from the railroad company in the early eighties and was the last piece of such land to be sold in the neighborhood on account of the fact that no one made an offer on account of the wet land on it. The upland depression on this piece of land has always been too wet to farm with any assurance of a crop. Mr. Olson has raised four crops on the land but only two of these could be harvested; the other two were lost due to water being over the land to a considerable depth. Tile was installed in October 1920.

COST OF PROJECT

The actual cost of installing the tile was as follows:

| | |
|---|---|
| Tile | $ 690.91 |
| Labor on ditch | 531.21 |
| Hauling tile | 45.00 |
| Catch basins | 50.00 |
| | $1317.12 |
| Cost per acre | $76.10 |

(Report on visit 5/25/21 by I. D. Wood)

After two rains of about 2½ inches each the ground was in condition to work in about three days. At the time of the visit the ground was mellow and in splendid condition. It was planted to listed corn. The catch basins functioned perfectly and quickly removed the surface water.

the spread of influence, but while it may be possible to trace many good pieces of work in a county to a demonstration it will never be possible to know the exact extent of the spread of influence.

The second sheet of the project sheet is intended for recording anything of interest which has not been shown on the first sheet, such as extracts from letters from the cooperator, cost data, crop yields on reclaimed land, and other specific information regarding the success of the work and the spread of influence from it.

To be of greatest value a record system must be kept up to date. The machinery for keeping the project sheets up to date will be explained in the following paragraphs. The three methods of collecting data pertaining to projects to fill in the follow-up record and the second sheet are: (1) Visits to the cooperator when in the county; (2) letters or visits to the county extension agent; and (3) letters to the cooperator.

Of the three methods the visit to the cooperator is, of course, the most effective. The engineering specialists at Nebraska have followed the practice of carrying a list of the projects in a certain county when a visit to that county was contemplated. It is often possible to call and inspect demonstrations personally or, at least, to confer with the county extension agent regarding them. In any event the cooperator can be sent a self-addressed envelope containing a form to be filled out and returned. This form will convey the desired information regarding crop yields, cost, etc., which is to be copied on the second sheet of the project sheet. For instance, he may state that the land included in a certain drainage project yielded sixty bushels to the acre the first year after the tile was installed. Such information is important and should be recorded. Each year the projects in each county should be followed as closely as possible.

The machinery for recording visits, letters, and blue prints sent is simple and requires no time on the part of any one but the stenographic force. The call card is carried by the specialist in the field and is made out after a call is completed or, in the office, it is made out when a cooperator calls. The card for meetings, tractor demonstrations, etc., is filled out in the field and brought back to the office and filed under the county name in which the meeting or tractor demonstration was held. At the end of the year these cards give an accurate record of the number of meetings, the attendance, and the place where the meeting was held.

In the office of the engineering specialist is a file of folders marked from "A" to "Z" called the "project file." The stenographic force goes through this file each month and records all data which has collected there on the project sheets which are kept in a separate file and indexed under the name of the county in which the project may be located. For instance, suppose a specialist returns from the field with a call card filled out after having called to inspect the Peter Olson Drainage Project; also that he sends Mr. Olson some additional blue prints and writes him a letter giving some specific information regarding the project. How does this material become recorded on the project sheet without individual attention from the specialist? The call card is simply dropped in the project file under "O" for "Olson." The blue print order is made out in triplicate and one copy goes in the project file under "O," The letter is dictated and as its subject has "Peter Olson Drainage Project," and is put in the project file under "O" until the end of the month when all material in the project file is transferred to the project sheets by the stenographer. Any special information which should go on the project sheets is placed in the project file by the specialist and recorded by the stenographer. This system insures that the data will reach the project sheets with a minimum of effort on the part of the specialist.

The office of the extension agricultural engineer at the University of Nebraska also maintains the following additional records:

1. A file of field notes (loose leaf) by counties
2. A file of blue prints of each engineering project installed under name of county
3. A card file of available stock blue prints
4. A card file showing cost of structures built from stock prints
5. A card file showing cost of common raw materials (to date)
6. A clipping file in which articles pertaining to engineering are filed
7. A card file showing all persons in the state who have had information from the office in the form of letters, bulletins, or blue prints. This file is cross-indexed under subjects as "Septic Tanks," "Dairy Barns," "Machine Sheds," etc. If it is desired to investigate the success of the buildings constructed from a certain machine-shed plan, for instance, it is necessary only to turn to this card file and see who have had information regarding machine sheds and send them a questionnaire
8. A file of photographs of work on projects, in the process of construction and finished
9. A file of special reports, specifications, etc., filed under the name of the county in which the work was done

The main points in the foregoing discussion may be summarized as follows:

1. Good records permit a new man to take up the work where his predecessor left it
2. A record system should permit a man to analyze his work
3. A practical system should not require much of the specialist's time
4. Office and record systems must be varied to suit conditions
5. "The Nebraska Record System for Extension Specialists" uses a project sheet from which one may tell at a glance all the important things about that project
6. The project sheet is kept up to date by means of card reports put in a project file by the specialist
   The project file is cleared at the end of the month and all data recorded on the project sheets by the stenographer
7. The detailed information is of special value when dealing with engineering projects
8. Other files are of value in the extension engineer's office

## The Divining Rod

Editor AGRICULTURAL ENGINEERING:

IN THE July number of AGRICULTURAL ENGINEERING is given an account of the divining rod, the article being based on information secured from the water supply bulletin. I thought it would be of interest to members of the Society to know of the experiments made by the Department of Agriculture, Bombay, India, described in their bulletin No. 72 of 1915. This is entitled "Experiments With the Automatic Water Finder in the Trap Regions of Western India." It is indicated in the bulletin that the trap regions such as occur in Western India, whether the water occurs in clearly defined streams flowing in rock fissures, "the automatic water finder can be used to advantage in locating streams of water." The behavior of the instrument is described in the bulletin and it is claimed that no dependence can be placed on it for locating water where the water occurs in sheets.

Agricultural Engineer H. E. MURDOCK
Montana Agricultural College

# Agricultural Engineering Development

A Review of the Activities and Recent Progress in the Field of Agricultural Engineering Investigation, Experimentation and Research

*Edited by* **R. W. Trullinger**
Mem. A.S.A.E. Specialist in Rural Engineering, Office of Experiment Stations, U. S. Department of Agriculture

BORDER IRRIGATION (at the Umatilla Reclamation Project Experiment Farm, Oregon). H.K.Dean (U.S.Department of Agriculture, Department Circular 110, pp. 17-19, figs. 12, Washington, D. C.). Border irrigation experiments consisting of studies of length and width of border are reported. The first series included borders 100, 175, and 250 feet long and 22 feet wide, and the second, borders 20, 25, 30, 35, and 40 feet wide and 200 feet long. The average quantity of water used in the length-of-border experiments increased with the length of border, but this increase was much less for the first 75 feet of additional length than for the second 75 feet. The average water requirement in acre-feet per acre was 4.18 for the short plat, 4.86 for the medium plat, and 6.45 for the long plat.

In the width-of-border experiments the quantity of water in acre-feet per acre required to irrigate the 20 and 25-foot borders was the same. The 30-foot border did not require excessive amounts of water, but the 35 and 40-foot borders did. The water required for a single application was in the same proportion as the total quantity used.

It is the opinion that border irrigation is more economical of water and labor than flooding or furrow irrigation.

RESEARCH WORK ON INSULATING MATERIALS (Ontario Agricultural College and Experiment Farm Annual Report, Guelph, Ontario, Canada, 45 (1919) pp. 47.49). Laboratory studies of the relative insulating values of very fine black regranulated cork, coarse black regranulated cork, granulated cork, sawdust, planer shavings, chopped straw, forest leaves, and ordinary excelsior showed that the very fine black regranulated cork had the highest insulating value, followed in order by chopped straw, coarse black regranulated cork, and forest leaves. The sawdust, excelsior, and planer shavings showed the lowest insulating values.

STUDIES ON THE TREATMENT AND DISPOSAL OF INDUSTRIAL WASTES, IV, THE PURIFICATION OF CREAMERY WASTES, H. B. Hommon (U. S. Public Health Service, Public Health Bulletin 109 (1920) Washington, D. C., pp. 87, pls. 5). A study is reported which was undertaken by the U. S. Public Health Service in cooperation with the U. S. Department of Agriculture for the purpose of developing a method for purifying creamery wastes. In the course of this study it was found that methods already in use were efficient and practical in only a very few instances and very unsatisfactory in a large number of other installations.

The raw waste treated in the experimental stations was produced from the manufacture of butter, cottage cheese, casein, and condensed milk and were very concentrated. The original plans for the testing station included an Imhoff tank and a septic tank. Difficulties were encountered in operating the Imhoff tank which finally led to its abandonment. The septic tank was operated for about two years. A comparison of the weighted average analyses of the influent and effluent for the entire time the tank was operated showed that 40 per cent of the suspended matter in the raw waste was deposited in the tank. The septic tank did not accomplish as high a removal of the various constituents of the raw waste as was expected. It was not provided with a tight cover at the beginning of the tests, but this became necessary during the spring following the first winter. This experience suggests the necessity of locating septic tanks and filters as far away as possible from the creamery or from dwellings and other buildings.

Sand filters were used for treating the effluent from the septic tank. The effective size of the sand used was 0.23 millimeters and the uniformity coefficient was 2.17. It was found that the essential features that should be considered in designing sand for filters for treating creamery wastes are as follows: (1) The underdrainage should be laid carefully with ample slope to the bottom and covered with coarse and fine stones to prevent the entrance of sand; (2) the sand selected should be of medium size and free of clay and loam; (3) the filter units should be arranged to provide for a number of doses; (4) filter beds should be divided into at least two units so that one can be taken out of service for the purpose of resting or repairs; and (5) unless the treatment plant is to be under constant and competent supervision the filter should be designed to treat the waste at a rate not to exceed 50,000 gallons per acre per day.

Observation of the sludge showed that there was an average deposition of two tons of dry soils per one million gallons of waste passing through the tank. The chemical analyses showed that it contained no valuable by-products and that it had no high-grade fertilizer value. It was found that pumping will be required where the difference in elevation between the discharge of the waste to the disposal site and the outlet into the water course is less than 7 feet. A centrifugal pump and automatic control device are recommended for this purpose.

It was found that the detention period of 24 hours was not sufficient to remove as large a part of the suspended matter as is believed could be accomplished. It is recommended, therefore, that tanks designed for creamery or like wastes be computed on a storage basis of 48 hours with 30 per cent for scum and sludge accumulation. It is recommended that the tank be divided into two sections separated by a concrete wall with 2-inch holes through it at mid-depth of the waste. The inlet section should have a capacity of two-thirds of the volume of the entire tank and the outlet section one-third. The inlet section should contain at least three baffles, one one foot from the inlet pipe and extending from above the surface of the waste to three feet below, one one foot in front of the outlet and conforming to the one before the inlet, and one in the center of the tank extending up one-half from the top of the hopper bottom to the flow line of the tank. The hopper bottoms should have a slope of 60 degrees

and the sludge outlet should be 6 inches in diameter. The inlet and outlet pipes to and from the tank should be turned down and trapped. It is recommended that a siphon be installed in connection with the disposal tank and that the siphon chamber be designed so as to discharge enough waste each time to cover the sand filter to a depth of one-half inch.

A large amount of experimental data is given in tabular form, together with a bibliography.

STABILITY OF AND HEAT TRANSMISSION THROUGH THIN WALLS (*Surveyor and Municipal and County Engineer*, London, 58 (1920 No. 1492, pp. 123, 124). This is a report of the building materials research committee of the Department of Scientific and Industrial Research, of England, in which the results of investigations on the stability of thin walls and heat transmission through thin walls are presented.

It is concluded that walls as thin as 2⅝ inches can be used safely for partitions in cottage building in England even when supporting joists. In the heat transmission studies, a 4½-inch rough concrete wall offered the least resistance, while a 10-inch concrete cavity unventilated wall with the inner partition of coke breeze offered the greatest resistance to the flow of heat, indicating the efficiency of the breeze as an insulator.

The insulating effect of the wall was found to be comparatively little reduced by providing a limited amount of ventilation in the cavity, particularly if this is arranged at the base of the cavity only.

EXPERIMENTS ON IRRIGATION IN THE BRUCHHAUSEN, SUKE, AND THEDINGHAUSEN ASSOCIATION DISTRICT, Province of Hanover, Germany, 1901-1912, B. Tacke (Arbeiten der Deutsche Landwirtschaftliche Gesellschaft, Berlin, No. 291 (1918), pp. 150, pls. 7, figs. 5). Experiments on combined irrigation and drainage supplemented by cultivation and fertilization are reported, which extended from 1901 to 1912 inclusive.

The soils on which the experiments were conducted were heather sand, clay sand, and moor soils. The different irrigation practices included mainly border flooding and furrow irrigation, and drainage was accomplished by border ditches. Irrigation in general was found to increase crop yields. Furrow and border flooding irrigation gave better results than so-called over-storage irrigation. Furrow irrigation gave better results than the border method owing to better utilization of the water and the more intensive cultivation. On moor and sand soils there was little difference in the results obtained from narrow and broad checks between the furrows, but on clay soils the broad checks were apparently the more desirable. Larger water quantities were better utilized on the furrow checks than smaller quantities. The reverse was true with border flooding.

The maximum results of irrigation were produced when it was supplemented by phosphoric acid and potash fertilization. Heavy additions of phosphoric acid gave better results than light applications, while with potash on sand soil the reverse was true. The results obtained from the use of potash on the moor and clay soils did not much more than pay for the potash applied. Potash, when used alone, gave no beneficial results and sometimes caused injury to crops. The time of fertilization, whether before or after irrigation, apparently made no difference in the results.

Relatively weak drainage, resulting in a lowering of the ground-water level to about 30 centimeters (about 12 inches) and permitting considerable storage of soil water, gave better results than drainage to 50 or 60 centimeters. This was true where the storage water was renewed constantly; otherwise better results were obtained by maintaining the soil water at a depth of from 45 to 50 centimeters during the growing period.

Better general results were obtained on narrow than on broad plats in the moor soil, but little difference was observed in the depths to ground water. Cultivation apparently had no permanent effect on the yield of the irrigated plats, but planking on the clay soils was found to be a bad practice. Liming did not appear to be necessary on these soils.

The storage of drainage water in the drainage ditches caused a rapid rise of the ground-water level in all three soils . The fall of the ground-water level was about the same in all three soils as the drainage ditches were emptied. The degree of the influence of raising and lowering the water level in the drainage ditches on the ground-water level was found to depend also upon rainfall, evaporation, and humidity.

THE USE OF CONCRETE PIPE IN IRRIGATION, F. W. Stanley and S. Fortier (U. S. Department of Agriculture Bulletin 906 (1921) pp. 54, figs. 36, Washington, D. C.). Information concerning pipe and pipe systems, and more especially the use of concrete pipe in irrigation, is presented in this bulletin, together with such practical suggestions regarding making and laying as to enable those engaged in the work to avoid mistakes and attain satisfactory results. The information presented appears to be based largely on the experience of different water and irrigation companies, principally in California. The different phases of the subject discussed are plain and reinforced concrete pipe, manufacture and cost of plain concrete pipe, pipe systems for irrigation, settling basins, screens, air vents, relief stands, measuring devices for pipe irrigation systems, and distributing hydrants.

During the past ten or fifteen years the greater part of the pipe used for irrigation pipe systems has been made of concrete. The principal reasons for its extended use are its relative cheapness, durability, strength, and general adaptability to irrigation requirements. Concrete pipe is made both reinforced and plain. Reinforced concrete pipe 12 to 72 inches in diameter are made in yards of collapsible forms either of wood or steel. Either wire mesh or steel hoops are used for reinforcing, the amount and spacing depending upon the head under which the pipe is intended to operate. Reinforced pipe are laid in a trench the same as plain concrete pipe, the joints usually being poured by the use of special forms.

Plain concrete pipe are divided into two general classes, hand-tamped and machine-made pipe. Hand-tamped pipe is made by tamping concrete between inside and outside collapsible forms. The forms usually run from 6 to 36 inches inside diameter. The pipes are made for the most part in 2-foot lengths, although some are made 30 inches in length. Pipe machines are roughly classified as tamping machines and troweling machines. Some tamping machines tamp the pipe very similarly to the hand-tamping process. The mechanism of most of these machines causes the pipe to revolve under the tamper while the concrete is poured in between the forms.

A pneumatic air tamper may be used to tamp the pipe. Troweling machines make use of iron vanes that force the concrete down and against the outside form. The vane or packerhead apparatus is revolved by machinery and at the same time is lifted from bottom to top of a length of pipe while it is being made.

With reference to the materials used in the manufacture of concrete pipe it is stated that the sand should be clean; the rock clean, hard, and durable, and the whole aggregate well graded. If gravel is used, the materials should be clean and hard, with a minimum amount of organic matter. The presence of clay or silt free from organic matter in the gravel

may not be harmful, and tends to make an impervious pipe if it is not present in too large quantities. Rock dust may be added with a benefit to the pipe, while a certain proportion of lime will tend to make an impervious pipe. Soft or partially disintegrated rock or gravel is very harmful, especially if high-pressure pipe are desired.

Concrete pipe should be laid deep enough in the trench so as to reduce the range of temperature and to be safe from injury against plows, subsoilers, or other farm implements. There should be at least 12 inches of earth over the top of all kinds of pipe, and high-pressure pipe should have a top covering of at least 18 inches. Temperature changes in the shell of the pipe are greatly reduced when the pipe is buried deeply, and less trouble is experienced from expansion and contraction. The moisture content within the shell of the pipe is likewise kept more uniform than where the upper half is laid near the surface of the ground. After the trench is dug and the pipe to be laid strung along the side of it, one expert pipe layer with two helpers will sometimes lay as much as 1200 feet of 8 to 12-inch pipe in a day, but 800 feet is a good day's work for an average crew. Four men will lay the pipe and partially backfill the trench. Four men are usually needed to lay pipe from 14 to 18 inches in diameter, and will average 300 to 500 feet of this size in a day. Five to seven men will lay from 300 to 500 feet of 24-inch pipe in a day. There is wide variation in the cost of laying pipe and the quantity of mortar used in making the joints. If heavy bands are made at the joints for high-pressure lines, it often costs from 25 to 50 per cent more to lay the pipe. One pipe manufacturer estimates that one sack of cement made into one to one and a half mortar will lay 350 feet of 6-inch pipe, 270 feet of 8-inch, 200 feet of 10-inch, 160 feet of 12-inch, and 70 feet of 20-inch pipe. If bell-ended pipe is used, similar to the ordinary clay sewer pipe, more mortar is needed.

One of the most frequent causes of failure of concrete pipe is a poor grade of pipe. Probably the greatest trouble with breaks and leaks in concrete pipe lines is caused by expansion and contraction. Concrete expands with a rise in temperature, but it also expands when saturated and contracts when becoming dry. A thoroughly air-dried pipe may contract as much in the process as it would under a fall of temperature of 100 degrees Fahrenheit. In such cases cracks 0.18 of an inch every 25 feet or so are liable to appear. These cracks may close up when the pipe is refilled with water or trash such as small particles of rock, sand, or tree roots may enter and prevent closure. There are two methods of reducing to a minimum the trouble with expansion or contraction. The first is to lay the pipe under favorable conditions, the second is to provide expansion joints at frequent intervals.

Irrigation pipe if kept full of water free from alkali salts tends to exclude ground water containing alkali from the shell of the pipe. If the pipe is under pressure, there seems to be little chance of alkali salts entering the pores of the pipe from the outside. Then, too, irrigation pipe is usually laid on the higher parts of the land that are freest from alkali. Briefly stated, the sulphates and magnesia salts seem to be the most harmful, but dense concrete made from wet mixtures is usually very little affected. Another source of failure in concrete pipe is the rupture of the pipe due to sudden increases of pressure, which may be caused by water hammer. Water hammer is especially troublesome where the water is pumped directly into a pipe line and where the pipe is of considerable length and runs up grade from the pump.

The usual method of preventing breaks from water hammer is to provide a standpipe. The standpipe or relief stand should be high enough to allow for grade and friction in the pipe when running at full capacity and should be about the same diameter as the main.

The following table prepared from field research data gives the carrying capacities of concrete pipe in miner's inches computed to the nearest 5 miner's inches and may be used in design:

TABLE OF CARRYING CAPACITIES OF CONCRETE PIPE IN MINER'S INCHES COMPUTED TO THE NEAREST 5 MINER'S INCHES.[1]

(FALL IN FEET PER 100 FEET)

| [illegible] | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 1.0 | 2.5 | 5.0 |
|---|---|---|---|---|---|---|---|---|
| | MINER'S INCHES | | | | | | | |
| 6 inches..... | 10 | 10 | 15 | 20 | 20 | 30 | 45 | 60 |
| 8 inches..... | 20 | 25 | 35 | 40 | 45 | 60 | 85 | 140 |
| 10 inches..... | 35 | 50 | 60 | 70 | 80 | 110 | 180 | 250 |
| 12 inches..... | 60 | 80 | 110 | 115 | 120 | 180 | 275 | |
| 14 inches..... | 85 | 120 | 150 | 170 | 200 | 275 | 400 | |
| 16 inches..... | 120 | 170 | 210 | 235 | 275 | 400 | 600 | |
| 18 inches..... | 160 | 230 | 285 | 330 | 450 | 550 | 825 | |
| 20 inches..... | 225 | 310 | 380 | 435 | 500 | 700 | 1,100 | |
| 22 inches..... | 275 | 400 | 485 | 525 | 625 | 900 | 1,400 | |
| 24 inches..... | 350 | 500 | 620 | 710 | 800 | 1,150 | | |
| 30 inches..... | 650 | 900 | 1.100 | 1.275 | 1,425 | | | |

[1]One miner's inch is here equivalent to the one-fifthieth part of a second-foot and is nearly equal to 9 gallons per minute.

It is stated that settling basins should be installed in a pipe line where vegetable or earthy material may clog the pipe. Also the insertion of standpipes at all points where air is liable to collect is recommended. Considerable tabular data for use in connection with measuring devices for pipe irrigation systems are included.

THE MOTOR TRUCK IMPACT TESTS OF THE BUREAU OF PUBLIC ROADS, E. B. Smith (U. S. Department of Agriculture, Public Roads, Washington, D. C., 3 (1921) No. 35, pp. 3-36, figs. 148). This is a progress report of the motor-truck impact tests being conducted by the Bureau of Public Roads of the U. S. Department of Agriculture.

It is stated that the results presented must not be considered as final. The indications are, however, that the impact value depends very largely upon the tire equipment. The condition of the tire determines the amount of cushioning effect it may offer. Thin or worn solid rubber tires, even though they are very wide, produce very high impact forces. The deflection of the tire depends upon its depth and quality, and any condition of the tire which adds to its deflection will serve to reduce the impact.

The actual shape and construction of the tire seem to have considerable influence upon its cushioning effect. So far as they have been tested, cushion tires seem to offer a decided advantage in reducing the impact. In this connection it is stated that the name "cushion" on a tire does not necessarily make it such a tire, and that some definitions and deflection requirements should be adopted for the classification of tires.

Pneumatic tires show a very great influence in reducing impact values, and the impact produced with such equipment seems to increase only very slightly with the speed. The width of the tires or the load per inch of tire width has only very little controlling influence upon the impact. The deflection of the tire is the main factor, and this is controlled only slightly by its width. A decrease in tire width increases the load per square inch of tire, which in turn causes a slightly greater tire deflection. Thus a large tire width does not tend to decrease the impact but rather to increase it, and a very wide but thin solid tire will give much higher impact forces than a narrow thick one.

Impact increases with the speed of the truck, but the relation is not a simple arithmetical ratio, nor can it be expressed simply as a certain power of the speed ratio. When striking an obstruction or irregularity, there is approximately a straight-line relation between impact and speed, but the equation of this curve depends upon the characteristics of the truck, the height of the obstruction, and the deflection of the tire as well as the speed. For approximate compari-

sons it is stated that the impact increases with the increase of speed from 10 to 100 per cent for solid tires, from 10 to 75 per cent for cushion tires, and from 0 to 10 per cent for pneumatic tires. An average of any of these limiting percentages must not be used. When dropping from one level to another the speed affects the impact value somewhat, according to the percentage variations given, up to a critical speed of from nine to twelve miles per hour. Beyond the point of critical speed at which the wheel falls freely there should be no increase in impact value.

Although heavy unsprung weights may give higher impact values than lighter unsprung weights, this is not the major controlling factor because controlling factors, such as tire equipment, spring stiffness, load carried, and speed may have a great influence and overcome any difference due to the unsprung weights. It is possible to operate a light-weight truck under certain loads and speed conditions so that it will produce as high impact values as a heavy truck under certain conditions.

The impact values may be as high as seven times the load at one rear wheel for a solid tire when striking a one-inch obstruction at sixteen miles per hour, an average value being about four times. It is considered probable that for pneumatic tires the maximum impact value is not more than one and three-fourths times the load at one rear wheel and an average value is not more than 25 per cent.

SUBSTITUTES FOR SEWERS, W. A. Hardenbergh (*Public Works*, New York, 50 (1921), Nos. 15, pp. 293-296; 17, 358, 359, figs. 10). Substitutes for sewers in common use in suburban districts, towns, villages, and rural communities are discussed. The methods most generally used are classified as temporary arrangements, such as pit, box, and can; semi-permanent arrangements, such as concrete vaults and modifications and septic closets; and permanent arrangements, such as chemical closets and small septic tank systems with running water.

A comparison of the first and annual costs for a ten-year period, maintenance, and operating expenses of the different more common types is given in the following table in order to show their relative expense:

APPROXIMATE COST OF SEWER SUBSTITUTES

| TYPE OF DISPOSAL | Installation | Interest and Maintenance | Scavenging | Total Cost | Annual Cost |
|---|---|---|---|---|---|
| Pit | $60.00 | $19.80 | $36.00 | $115.80 | $11.58 |
| Box (wood) and can | 24.00 | 10.02 | 70.00 | 104.02 | 10.40[1] |
| Concrete vault | 35.00 | 21.00 | 60.00 | 116.00 | 11.60 |
| Commercial L.R.S. | 38.50 | 23.10 | 20.00 | 81.60 | 8.16 |
| Homemade L.R.S. | 35.00 | 21.00 | 20.00 | 76.00 | 7.60 |
| Chemical toilets | 65.00 | 39.00 | 50.00 | 154.00 | 15.40 |

[1]Does not include share of disposal expense, as purchasing land for burial, etc.

DUST EXPLOSIONS: CAUSE, EFFECT AND PREVENTION, D. J. Price (*Engineering News-Record*, New York, 86 (1921), No. 15, pp. 634-636, figs. 3.) A brief review is given of some of the work of the U. S. Department of Agriculture on the cause, effect, and prevention of dust explosions. Ignition temperatures resulting in explosion were determined as follows: 2,368 degrees Fahrenheit, for wheat elevator dust; 2,300 degrees, for flour; 1,821 degrees, for oats and corn elevator dust; 1,868 degrees, for oats hull dust; and 1,877 degrees, for yellow corn dust. Limited tests indicate that the velocity through a cloud of wheat flour dust is practically the same as through coal dust and that through a cloud of powdered starch it is several times as rapid.

Tests conducted in cooperation with the U. S. Bureau of Mines showed that the following pressure in pounds per square inch was developed: Lycopodium, 17.5; wheat smut dust, 15.9; yellow corn, 15.2; dextrin, 14.6; tan bark, 13.3; wheat elevator dust, 13; wood dust, 12.8; corn starch, 12.7; sugar, 12.2; potato flour, 11.7; fertilizer, 10.5; coal (Pittsburg), 10.1; cocoa, 9.1; sulphur, 8.8; and cork, 7.4.

From the known chemical composition of flour and a calculation of the approximate mechanical work which a given mass of flour can perform, it has been found that the contents of an ordinary sack, when mixed with 4,000 cubic feet of air, will generate force enough to throw a 2500-ton mass to a height of 100 feet.

It is considered reasonable to conclude that the dust explosion hazard is greater during periods of continued low humidity. Possible changes in construction and the installation of mechanical equipment suggested by recent explosions are discussed. Among these the prevention of the generation of high pressures by the use of thin walls offering little resistance to explosion pressures is suggested.

TRACTORS IN FLORIDA, F. Rogers (Florida University Extension Circular, Gainesville, Florida, 12(1920) pp. 8). An economic report on 93 tractors of 11 different makes and 6 different sizes in Florida is given.

Of the 93 tractors studied, 72 or 77.5 per cent were considered profitable and 12 or 12.9 per cent were considered unprofitable. No report was received regarding 5, and the remainder were not decided upon.

The principal advantage of the tractor was found to be its ability to do a great amount of work in a short time and the principal disadvantage was the excessive wear of parts. The average reduction of horses due to tractors was 3.3 for 66 farms; 16 farms reported no reduction. Forty-seven farms reported an increased acreage, and 26 reported no increase due to the use of tractors. The two-plow machine was found to be the most common. An average day's work of ten hours for this size was five acres. About the same amounts of gasoline and kerosene were required to plow an acre, the average for all machines being 2.62 gallons of fuel per acre.

Data on maintenance and cost of operation are also included. It was found that the annual repair bills were high as compared to the East and Central West, but less than for those sections per day of service.

THE MODERN COTTAGE: EXPERIMENTS IN PISE AT AMESBURY, C. Williams-Ellis (Journal Ministry of Agriculture, London, 27 (1920) No. 6, pp. 529-534, pls. 5). This report outlines an experiment made to compare four farm cottages of monolithic concrete, two of cob, six of pise de terre (or earth rammed between movable molds), two of timber, and two of timber and brick work.

The purpose of this experiment was to determine the value of pise de terre construction as compared with the other types. The available data show that so far the cost of pise de terre construction is but little less than that of brick work. The material used in the tests was approximately a 2:1 chalk and earth mixture. It was found that the essential qualities of a soil for pise de terre work are a firm coherence of the constituent particles when rammed and dried, combined with an absence of an excessive shrinkage in the process of drying. In general the percentage of water should vary between 7 and 14 per cent of the weight of the dried earth. A clay-gravel-sand mixture gave the best results with 15 per cent of water, while a chalkloam mixture gave the best results with 7 per cent of water. The shrinkage should not exceed from 2½ to 3 per cent and can generally be kept less than 2 per cent when the water content is low. An iron rammer with a smooth surface was found to be more satisfactory than a wood rammer. While winter construction was found to be possible it was not economical. The details of different forms used are illustrated.

A SIMPLE METHOD OF WATER SUPPLY, P. A. A. F. Eijken (Geneeskundig Tijdschrift voor Nederlandsch-Indië, Batavia, 58 (1918), No. 1, pp. 140-143). Experiments are described in which it was found that where the ground water is of suitable chemical composition a supply of potable water may be obtained by the use of gravel pits. These are constructed by throwing coarse gravel into existing shallow wells, followed by successive layers of gravel of decreasing size, with a final layer of fine sand. It is stated that the water pumped from such wells is equal in quality to that purified by more elaborate processes. Analyses of samples are included.

THE VENTURI FLUME, R. L. Parshall and C. Worher. [Colorado Station (Fort Collins) Bulletin 265 (1921), pp. 28, pls. 7, figs. 14.] Experiments conducted in the hydraulic laboratory at Fort Collins, Colorado, at Cornell University, and at the field laboratory at Bellvue, Colorado, under a cooperative agreement between the Irrigation Division of the Bureau of Public Roads of the U. S. Department of Agriculture and the Colorado Experiment Station, are reported.

The report is intended to present a more complete statement as to the law of flow through the Venturi flume, and to define more clearly its limitations and advantages than was done in a previous contribution from the station.

It is stated that the Venturi flume is intended to meet those conditions for which the standard weir or other measuring devices are not suited, the most important application being where sufficient head is not available for other types of measuring devices. The accuracy of the Venturi flume is said to be sufficient to meet ordinary requirements, and by actual computation it has been shown that for all sizes of rectangular flumes investigated with discharges ranging from less than 1 second-foot to nearly 400 second-feet, 94 per cent of all tests show an error in discharge of 5 per cent or less. A similar comparison for the V-notch flume shows that for discharges ranging from 0.1 to 10 second-feet, 70 per cent of all the tests show an error of 2 per cent or less.

The following formula is given for discharges through the rectangular Venturi flume:

$$Q=\left[(0.9975-0.0175\,W)+\frac{(Hd-0.163\,Ha^{1/2})^2}{\left(\frac{8}{20-W}\right)Ha^2}\right]W Hb\sqrt{\frac{2g\,Hd}{1-9/19\left(\frac{Hb}{Ha}\right)^2}}$$

Where $Q$ = discharge in second feet,
$W$ = width of throat in feet,
$Hb$ = head at the throat in feet,
$Ha$ = Head in converging section in feet,
$Hd = (Ha-Hb)$ = difference in the two heads.

The logarithmic discharge diagrams for rectangular Venturi flumes varying in width from 1 to 5 feet are given, based on this formula. The following formula is given for the discharge through V-notch Venturi flumes:

$$Q=C\frac{Hb^2}{2}\sqrt{\frac{2g\,Hd}{1-\frac{Hb^4}{(2\ 2\text{-}3+Ha)^2\,Ha^2}}}$$

Where $Q$ = discharge in second feet,

$$C=0.930+(4.07-1.4\,Ha)\,(Hd-0.05\,Ha-0.04)^2-\frac{0.362}{e^{80Hd}},$$

$Ha$ = upper head in feet
$Hb$ = throat head in feet,
$Hd = (Ha-Hb)$ = difference in head in feet,
$e = 2.7183$.

A logarithmic discharge diagram corresponding to this formula is also given. The application of the formulas given is not recommended for determining discharges for flumes having throat widths or depths beyond the limits of those shown in the diagrams, as the results will be only approximations.

In order to obtain the best results from the rectangular Venturi flume, it is recommended that four gauge wells be installed and that the mean reading be used in determining the discharge. Frequent testing of the sensitiveness of the gauge wells is considered advisable. Scales or gauges attached to the inside surface of the flume for determining the head are said to be not sufficiently accurate for general purposes. It is also considered advisable, if the head is available, to operate the flume with the greatest difference in head possible since the accuracy increases as the difference in head increases.

THE SEPTIC TANK AS A METHOD OF SEWAGE DISPOSAL FOR THE ISOLATED HOME, H. E. Murdock, [Montana Station (Bozeman) Bulletin 137 (1920), pp. 27, figs. 14.] A progress report is presented on studies begun in 1915 at the Montana agricultural experiment station with three different types of sewage treatment tanks and disposal areas, together with general information regarding results obtained from miscellaneous installations in the neighborhood.

It was estimated that the experimental tanks would care for an amount of sewage equivalent to that from 30 to 40 persons, and the tanks were designed for that amount. The tanks included: (1) a single-chamber septic tank 3 feet wide, 7 feet 10 inches long, and 3 feet deep, with the inlet pipe 18 inches below the surface of the sewage scum and the outlet pipe from 6 to 8 inches below the surface of the scum, an air vent being placed in the top of the outlet pipe; (2) a double-chamber septic tank with digestion chamber 2 feet wide, 5 feet long, and 4½ feet deep, and a discharge or siphon chamber 2 feet wide, 2½ feet long, and 2 feet deep; and (3) a modified Imhoff tank 3 feet 4 inches wide, 4 feet 4 inches long, and 14 feet deep at one side and 16 feet deep at the other. All three tanks were provided with sludge outlets.

No very definite data are given regarding the nature and amount of the sewage treated or the basis of design of the tanks. However, it is noted that during four winter seasons the sewage flow to the tanks varied widely in nature and amount and was discontinued for considerable periods from time to time. Three types of disposal area were used and were made of 4-inch clay drain tile laid without cement with the ends abutting. The disposal lines were laid out practically on contours with a fall of 0.1 foot to 100 feet. The top of the tile line is approximately 14 inches below the surface of the ground.

The simplest type of disposal area is that connected with the single chamber septic tank. It is 72 feet long and is connected with the tank by a length of 25 feet of open joint tile. The second disposal area is the one into which the sewage from the double chamber tank is discharged by the siphon intermittently. This area consists of two parallel lines, one 25 feet long and the other 90 feet long, connected by a cross line 10 feet long. The third type of disposal area is connected with the modified Imhoff tank. It consists of two parallel lines 91 feet long connected by a cross line 10 feet long, forming duplicate area to be used alternately for periods of a week at a time.

After the four seasons it was found that approximately the same amount of scum was on the surface of each tank. It appeared that the septic action and the disposition of sludge were practically the same in the three tanks. There was very little sludge deposition and apparently septic action was good in all three tanks in spite of the variable conditions of service imposed. The disposal areas apparently cared for the sewage effluent satisfactorily and seemed to be little hindered by long periods of zero weather. It is noted, however, that the experimental work so far has been done with rather favorable soil conditions, and no tests have been made in heavy gumbo or clay soil. On account of the simplicity, ease of construction, and comparatively low costs of the single-chamber tank, it has been recommended for isolated homes where conditions are similar to those of the experiments.

# A. S. A. E. and Related Activities

## Council Meeting October 11

THE Council of the Society will hold a meeting October 11 at Room 704 Masonic Temple, Chicago. The following are some of the more important matters that will be brought up for attention at that time: Program for the annual meeting, Society finances, national tractor show exhibit, and the location of Society headquarters.

## Silage Cutter Tests at Wisconsin

THE Belt Machinery Committee of the American Society of Agricultural Engineers has been conducting a series of important tests on silage cutters at the University of Wisconsin in cooperation with the Department of Agricultural Engineering of that institution and silage cutter manufacturers. The purpose of these tests is in line with the program reported in the July 1921 issue of AGRICULTURAL ENGINEERING, that is, to secure data which may be used as a basis for arriving at a uniform method or formula for rating silage cutters, which problem the committee has been working on for the past year.

In addition to the tests that have been conducted at the University of Wisconsin, several manufacturers of silage cutters are running tests on their own machines. As soon as the tests have been completed the committee will hold another meeting, at which time the results of the various tests will be compared and an effort made to reach a satisfactory basis for rating silage cutters, which the committee can recommend for adoption to manufacturers.

## Annual Meeting in December

THE program for the annual meeting of the American Society of Agricultural Engineers which is to be held December 27, 28, and 29, at the Auditorium Hotel, Chicago, has been rapidly taking shape and gives promise of being the best program ever put on by the Society. The Meetings Committee has been very fortunate in securing some exceptionally valuable papers by able men.

The general plan of the annual meeting this year is to devote the afternoon of December 27 to the Reclamation Section, and the evening to the College Section; the morning and afternoon of December 28 to farm structures, and the evening to the banquet; and the morning and afternoon of December 29 to farm power and machinery. The Meetings Committee has the details of the program very near completion and there is every indication that this year's meeting will be larger and better than ever. The details for the program of the Reclamation Section are under the direction of David P. Weeks, chairman of the Drainage Committee, Mitchell, South Dakota, and W. G. Kaiser, chairman of the Farm Structures Committee, Portland Cement Association, Chicago, is working out the program for the farm structures session. I. W. Dickerson, Charles City, Iowa, general chairman of the Meetings Committee, is working out the program for the farm power and machinery session.

## National Drainage Congress Meets

THE National Drainage Congress held its annual meeting in St. Paul, Minnesota, September 22, 23, and 24. Prominent reclamation engineers appeared on the program, some of the papers presented being as follows: "Colonization," by Dr. F. H. Newell; "Legal and Engineering Aspects of Drainage in Illinois," by F. N. DeWolf; "Outlet Drainage and Flood Control Districts," by L. K. Sherman. Other subjects of interest to reclamation engineers that will be presented during the meeting are practice in subsidiary drainage work including filling and ditch maintenance; drainage pumping plants—relative efficiency of electricity, steam, and oil; and development in drainage and excavating machinery.

The Drainage Committee of the American Society of Agricultural Engineers, of which David P. Weeks is chairman, also held a meeting in connection with the National Drainage Congress. Also a special effort was made at that time by the Reclamation Section of the Society to present to the Drainage Congress the matter of this new section which has been recently organized in the Society and stimulate the interest of reclamation engineers in what it proposes to do.

## Lubrication Engineers in First Convention

THE American Society of Lubrication Engineers will hold their first annual convention in Chicago, October 13 and 14, 1921.

Special effort is being put forth by the officials of the society to assure those who attend a splendid program. A number of eminent authorities will read papers. A number of the largest manufacturing plants and oil refineries in this vicinity have issued invitations to visit and inspect their works.

This society was established to promote a better understanding of the problems of lubrication and the use of liquid fuel, including all of the problems of application and conservation. As the main endeavor is to interest those whose lives are partly if not wholly coming in contact with these problems, the convention will be open, not only to the members of the society, but to all interested in the work.

Full details of the program will be given out within a short time. If further information is desired, address the society at the Monadnock Block, Chicago.

## Personal Items of Members

DAVID P. WEEKS, drainage engineer for the Dakota Engineering Company, was recently awarded the degree of civil engineer from the University of Nebraska, in recognition of his accomplishments along civil-engineering lines. Mr. Weeks also holds the degree of master of science in agricultural engineering from Iowa State Agricultural College. Mr. Weeks' activities in civil engineering work have been largely confined to its application to agriculture principally to drainage and irrigation.

## Wanted—Correct Addresses of These A. S. A. E. Members

(NOTE: Mail is being returned from the addresses given below. These persons or others will be conferring a distinct favor if they will furnish at once correct addresses to the Secretary.)

Charles J. Allen, 32 East Oak Avenue, Morristown, New Jersey.

George J. Baker, 122 Theodore Street, Detroit, Michigan.

Joaquim Bertino de Moraes Carvalho, Directoria Geral da Industria Pastoril Rua Matta Machando, Rio de Janeiro, Brazil, South America.

Prof. Marcelo Conti, University of Buenos Aires, Argentine Republic, South America.

J. D. Eggleston, 1638 Iowa Street, Dubuque, Iowa.

Harrold W. Ferris, 73 West Forty-fifth Street, New York City.

## New Members of the Society

MEMBERS

Edward Blodgett, superintendent and engineer, The J. B. Rowell Company, Waukesha, Wisconsin.

A. M. Chase, automotive engineer, Ordnance Department, tank, tractor, and trailer division, Syracuse, New York.

Max E. Cook, farmstead engineer, the land settlement board of the State of California, Delhi, California.

George Clark Heston, designer, Roderick Lean Manufacturing Company, Mansfield, Ohio.

Byron Burnett Robb, professor of rural engineering, New York State College of Agriculture, Ithaca, New York.

John D. Runte, chief inspector, Emerson-Brantingham Company, Rockford, Illinois.

Frank J. Sprung, sales manager, John Deere Plow Works, Moline, Illinois.

Leslie Webb Symmes, agricultural engineer and director, Leslie Symmes and Associates, Holbrook Building, San Francisco, California.

ASSOCIATE MEMBERS

Robert H. Black, in charge of grain cleaning investigations, U. S. Department of Agriculture, Minneapolis, Minnesota.

LeRoy Fitch Beers, proprietor, L. F. Beers Suburban Engineering, Rochester, New York.

J. H. Fulmer, farmer and dealer, J. H. Fulmer Auto Company, Nazareth, Pennsylvania.

John Staley Glenn, assistant agricultural engineer, extension division, Virginia Polytechnic Institute, Blacksburg, Virginia.

Horace L. Smith, Jr., associated with Horace L. Smith, Sr. in the development and manufacture of special machinery, Petersburg, Virginia.

JUNIOR MEMBERS

Henry Bradley Boynton, assistant agricultural engineer, extension division and college, Virginia Polytechnic Institute, Blacksburg, Virginia.

Clarence Emmet Shiplet, assistant superintendent, Roderick Lean Manufacturing Company, Mansfield, Ohio.

Guy Gregor Spokely, roadman, Ford Motor Company, Minneapolis, Minnesota.

## Applicants for Membership

The following is a list of applicants for membership received since the publication of the August issue of AGRICULTURAL ENGINEERING. Members of the Society are urged to send pertinent information relative to the applicants for the consideration of the Council prior to their election.

C. D. Butchart, president, C. D. Butchart Company, Denver, Colorado.

Guy R. B. Elliott, assistant professor of farm drainage, University of Minnesota, St. Paul, Minnesota.

Felix D. Maramba, post-graduate work in agricultural engineering, Iowa State College, Ames, Iowa.

Arthur James McAdams, assistant land clearing specialist Court House, Marquette, Michigan.

Parke Randall, superintendent of experiments, International Harvester Company, Croix (Nord), France.

Earl A. Stewart, associate professor of agricultural physics, division of agricultural engineering, University of Minnesota, St. Paul, Minnesota.

Frank Spense Taylor, consulting engineer, Austin, Texas.

Edward M. Wilson, technical officer, Bureau of Industries, Mexico City, Mexico.